What is claimed is:

1. A process for preparing a porous chitosan-linking compound-zeolite hybrid, which comprises the steps of:

(a) forming a linking compound-zeolite intermediate by linking a linking compound to the surface of zeolite; and

(b) preparing said chitosan-linking compound-zeolite hybrid by reacting said linking compound-zeolite intermediate with chitosan or a linking compound-chitosan.

2. A process for preparing a porous chitosan-linking compound-zeolite hybrid, which comprises the steps of:

(a) forming a linking compound-zeolite intermediate by linking a linking compound to the surface of zeolite, in which the surface of said linking compound-zeolite intermediate displays functional groups unreactive with functional groups of chitosan or a linking compound-chitosan; and

(b) preparing said chitosan-linking compound-zeolite hybrid by homogeneously mixing said linking compound-zeolite intermediate with chitosan or said linking compound-chitosan and reacting the resulting mixture with a bifunctional compound to be reactive with said linking compound-zeolite intermediate and chitoan or said linking compound-chitosan.

3. A process for preparing a porous chitosan-linking compound-zeolite hybrid, which comprises the steps of:

(a) forming a linking compound-zeolite intermediate by linking a linking compound to the surface of zeolite;

(b) mixing said linking compound-zeolite intermediate with chitosan or said linking compound-chitosan;

(c) transforming the mixture of step (b) to a sponge form; and

(d) preparing said chitosan-linking compound-zeolite hybrid by forming covalent bonds between function groups of said linking compound-zeolite intermediate and function groups of said chitosan or said linking compound-chitosan contained in said sponge form.

4. A process for preparing a porous chitosan-linking compound-zeolite hybrid, which comprises the steps of:

(a) transforming a chitosan solution or a linking compound-chitosan solution to a sponge form;

(b) forming a linking compound-zeolite intermediate by linking a linking compound to the surface of zeolite; and

(c) preparing said chitosan-linking compound-zeolite hybrid by forming covalent bonds between function groups of said linking compound-zeolite intermediate and function groups on the surface of said chitosan sponge or said linking compound-chitosan sponge.

5. The process according to claim 3 or 4, wherein said forming covalent bonds between functional groups is carried out by heating treatment.

6. The process according to claim 1 or 3, wherein said process further comprises the step of preparing a double-crosslinked chitosan-linking compound-zeolite hybrid by reacting a bifunctional compound with said chitosan-linking compound-zeolite hybrid after the final step.

7. The process according to claim 1 or 2, wherein said process further comprises the step of preparing a sponge form of said chitosan-linking compound-zeolite hybrid by drying said chitosan-linking compound-zeolite hybrid after the final step.

8. The process according to claim 3 or 4, wherein said process further comprises the step of drying said chitosan-linking compound-zeolite hybrid after the final step.

9. The process according to claim 6, wherein said process further comprises the step of drying said chitosan-linking compound-zeolite hybrid to generate a sponge form after the preparation of said double-crosslinked chitosan-linking compound-zeolite hybrid.

10. The process according to claim 7, wherein said process further comprises the step of intruding water into said sponge form after the drying.

11. The process according to claim 8, wherein said process further comprises the step of intruding water into said sponge form after the drying.

12. The process according to claim 9, wherein said process further comprises the step of intruding water into said sponge form after the drying.

13. The process according to any one of claims 1-4, wherein said chitosan or chitosan-linking compound has a variety of forms.

14. The process according to any one of claims 1-4, wherein a size of pores of said porous chitosan-linking compound-zeolite hybrid is adjusted depending on a concentration ratio of said zeolite to said chitosan or chitosan-linking compound.

15. The process according to claim 3 or 4, wherein said transforming to a sponge form is carried out by freeze-drying.

16. The process according to claim 7, wherein said transforming to a sponge form is carried out by freeze-drying.

17. The process according to claim 9, wherein said transforming to a sponge form is carried out by freeze-drying.

18. The process according to claim 9, wherein said chitosan or chitosan-linking compound is provided in an aqueous solution and a size of pores of said porous chitosan-linking compound-zeolite hybrid is adjusted depending on a weight ratio of water in the aqueous solution to said chitosan or chitosan-linking compound.

19. The process according to any one of claims 1-4, wherein said linking compound used for preparing said linking compound-zeolite intermediate and said linking compound-chitosan is selected from the group consisting of the compounds represented by the following formulae:

Formula 1

$R_3Si-L-X$

Formula 2

$R_3Si-L-Y$

Formula 3

Y-L-Y

Formula 4

Y-Y

Formula 5

R_3Si-L

wherein, R represents a halogen atom, C_1-C_4 alkoxy or alkyl group in which at least one of three R groups is a halogen atom or alkoxy group; L represents substituted or unsubstituted C_1-C_{17} alkyl, aralkyl or aryl group which may have at least one oxygen, nitrogen and sulfur atom; X represents a leaving group selected from the group consisting of halogen, isocyanate, tosyl and azide; Y represents a reactive functional group of coordinate compounds capable of exchanging ligands selected from the group consisting of hydroxyl, thiol, amine, ammonium, sulfone and its salt, carboxyl acid and its salt, acid anhydride, epoxy, aldehyde, ester, acrylate, isocyanate (-NCO), sugar residue, double bond, triple bond, diene, diyne and alkylphosphine in which said reactive functional group may be present in the middle or at the terminal ends of said linking compound.

20. The process according to claim 6, wherein said bifunctional compound for double crosslinking is selected from the group consisting of the compounds represented by the following formulae:

Formula 1

X-L-X

Formula 2

Y-L-Y

Formula 3

L-Y

Formula 4

Y-Y

Formula 5

X-L

wherein, L represents substituted or unsubstituted C_1-C_{17} alkyl, aralkyl or aryl group which may have at least one oxygen, nitrogen and sulfur atom; X represents a leaving group selected from the group consisting of halogen, isocyanate, tosyl and azide; Y represents a reactive functional group of coordinate compounds capable of exchanging ligands selected from the group consisting of hydroxyl, thiol, amine, ammonium, sulfone and its salt, carboxyl acid and its salt, acid anhydride, epoxy, aldehyde, ester, acrylate, isocyanate (-NCO), sugar residue, double bond, triple bond, diene, diyne and alkylphosphine in which said reactive functional group may be present in the middle or at the terminal ends of said linking compound.

21. A porous chitosan-linking compound-zeolite hybrid, characterized in that it is prepared in accordance with the process of any one of claims 1-4.

22. An adsorbent characterized in that it comprises the porous chitosan-linking compound-zeolite hybrid of claim 21 and is capable of removing both cationic substances including heavy metals and anionic substances present in polluted water or wastewater.

23. A method for purifying water comprising contacting polluted water or wastewater to the porous chitosan-linking compound-zeolite hybrid of claim 22.